BUOYANT GAS CAP

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/431 690, filed December 6, 2002.

FIELD OF THE INVENTION

[0002] This invention relates generally to a gas or fuel cap and, more particularly, to a gas cap having buoyant properties.

BACKGROUND OF THE INVENTION

[0003] Recreational watercraft, such as jet skis, wave runners and motor-powered boats, all require fuel such as gasoline for operation. Thus, these watercraft all share a common feature in that each requires a gas cap to seal off the respective gas tank from the environment. In particular, the gas cap prevents the gas tank from being flooded with water when the watercraft is in operation. If too much water is allowed to enter the gas tank, performance of the watercraft can be adversely affected, and in some instances, damage to the engine can result.

[0004] Typically, watercraft such as those listed above are refueled at dock-side gas stations. In other words, the watercraft remains in the water while the gas tank is refilled. Commercially available gas caps are composed of metal and/or plastic materials which are not buoyant. Thus, if the gas cap is mishandled during refueling, it can be knocked or dropped into the surrounding water. If the operator of the watercraft is unable to quickly retrieve the cap, the cap will sink to the bottom of the body of water. Since dock-side gas stations rarely maintain a sufficient stock of gas caps for resale to customers, the watercraft is thus left with no barrier between the gas tank and the environment. Further, even when additional gas caps are available, the operator must bear the added expense of purchasing a

replacement. Thus, what is needed is a gas cap which will float if knocked into surrounding waters.

SUMMARY OF THE INVENTION

[0005] This invention is directed to a new and useful gas cap. The gas cap of this invention has a relatively large diameter upper section and a relatively small diameter lower section. The lower section includes a wall which surrounds and defines a recess. The wall has an internal surface adjacent the recess and an opposing external surface. A series of threads is formed on at least one of the internal and external surfaces. At least one of the upper section and the lower section is formed of a buoyant material, such as enhanced polyurethane.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] This invention is pointed out with particularity in the accompanying claims. The above and further features and benefits of this invention are better understood by reference to the following detailed description, as well as by reference to the following drawings, in which:

[0007] Figure 1 is a top view of the gas cap of the present invention;

[0008] Figure 2 is a cross sectional view of the gas cap taken generally along the section lines 2-2 in Figure 1;

[0009] Figure 3 is a cross sectional view of a gas cap according to an alternative embodiment of the present invention;

[0010] Figure 4 is a cross-sectional view similar to Figure 2, but shows the gas cap installed on a filler tube of a watercraft; and

[0011] Figure 5 is a fragmentary, diagrammatic view of the gas cap in place on a watercraft.

DETAILED DESCRIPTION

[0012] Referring to Figures 1 and 2, there is illustrated a fuel or gas cap 10 according to the present invention. In the illustrated embodiment, the gas cap 10 is a single or one-piece component having a relatively large diameter upper section or body 11 and a relatively small diameter lower section or body 12. The upper and lower sections 11 and 12 of the gas cap 10 are constructed of a plastic material, preferably an enhanced polyurethane, as discussed below. The upper section 11 is sized and contoured to allow an operator to easily grasp the cap 10 to either secure or loosen the cap. For example, the upper section 11 can define a plurality of inwardly projecting recesses 11A therein to provide a gripping surface which is easily grasped by the operator during manipulation of cap 10.

[0013] The lower section 12 is formed by a wall 13 which defines a recess 14. More specifically, the wall 13 has an internal surface 16 defining the recess 14 and an opposed external surface 17. A series of threads 18 are formed on the external surface 17 of the wall 13. Alternatively, the threads 18 can be formed on the internal surface 16 of the wall 13. It will be appreciated that placement of the threads 18 on either the internal surface 16 or the external surface 17 will be dependent upon the configuration of the particular filler tube or conduit to which the gas cap 10 will be secured. Further, the diameter of the lower section 12 will also be dependent upon the dimensions of the filler tube to which the gas cap 10 will be secured.

[0014] In the illustrated embodiment, lower section or body 12 depends downwardly from a lower side of upper section or body 11, and lower section 12 is generally annular in shape. Figures 4 and 5 show the cap 10 in place on the upper or free end of a filler tube or conduit 30 which communicates with a fuel storage tank 31

of a watercraft 32. The watercraft 32 may be, for example, a boat or a personal watercraft such as those associated with the brand name SEA-DOO®. The watercraft 32 may be driven by an internal combustion engine (not shown) which is supplied with fuel 33 from tank 31. Filler tube 30 as shown in Figure 4 includes an upper end 34 including threads 35 provided internally along the wall 36 of the tube 30. Threads 35 of tube 30 threadingly engage threads 18 of lower section 12 of cap 10 to secure cap 10 on tube 30. It will be appreciated that cap 10 may be secured on tube 30 by means other than threads, and that the threaded fastening of cap 10 to tube 30 is presented only by way of example. Further, tube 30 may be internally threaded as shown, or externally threaded in which case lower section 12 of cap 10 can be provided with internal threads as mentioned above.

[0015] To manufacture the gas cap 10, a polyurethane, such as a two-part polyurethane alumilite, is poured into a mold. A particulate filler consisting of hollow glass micro balloons, for example, is also poured into the mold. One suitable commercially available micro balloon filler is sold under the brand name EXTENDOSPHERES by Spherical Products Corporation of Valley Forge, Pennsylvania. The micro balloon filler is poured into the mold at a temperature of about 125°F. Preferably, the ratio of micro balloon filler to polyurethane is between 50 to 75 parts micro balloon filler for every 100 parts of polyurethane. The micro balloon filler and the polyurethane fuse in a centrifuge casting to form an enhanced polyurethane. Due to the properties of the micro balloon filler, the enhanced polyurethane is a buoyant material. Thus, when the enhanced polyurethane material sets in the mold, a gas cap 10 having buoyant properties is formed.

[0016] In addition to being buoyant, the enhanced polyurethane is preferable for manufacture of the gas cap 10 for a number of reasons. First, the enhanced polyurethane does not experience degradation when exposed to either fresh or salt water for prolonged periods of time. Second, the enhanced polyurethane is not brittle and therefore will not shatter if dropped on a hard surface, such as a dock or a marina ramp. Additionally, extended exposure to heat will not warp or deform the enhanced polyurethane material. Therefore, the gas cap 10 will not degrade due to extended exposure to heat and water, and will not crumble or shatter if dropped on a hard surface.

[0017] While the preferable composition of the gas cap 10 is disclosed above, it should be appreciated that any suitable buoyant material could be substituted. However, when selecting a material, the above listed considerations should be taken into account. In other words, the material should be able to withstand being dropped on a hard surface, and should be suitable for extended exposure to water and/or heat.

MODIFICATION

[0018] Referring now to Figure 3, a gas cap 110 according to an alternate embodiment of the present invention is illustrated. The gas cap 110 includes components that are identical or similar to components of the previous embodiment of the present invention. Therefore, a detailed description of these components will not be repeated. For continuity, those components which are similar or identical to components or features described previously have been labeled with the same reference numbers, plus one-hundred.

[0019] Whereas the gas cap 10 was a single or one-piece component formed by molding enhanced polyurethane, the gas cap 110 is formed from two distinct components or materials which are secured together. The gas cap 110

includes a relatively large upper section. The upper section 111 is composed of the enhanced polyurethane material disclosed above. In addition, the upper section 111 is manufactured by molding in the manner disclosed above.

[0020] The gas cap 110 also includes a relatively small diameter lower section 112 which is similar in size and shape to the lower section 12 of the gas cap 10. Thus, the lower section 112 is formed from a wall 113 which defines a recess 114. A series of threads 118 are formed on an external surface 117 of the wall 113. Whereas the lower section 12 of the gas cap 10 was formed of enhanced polyurethane, the lower section 112 is composed of another suitable material. The lower section 112 is formed in any suitable manner, such as by molding the material.

[0021] It will be appreciated that the gas cap 110 depicted in Figure 3 includes upper and lower sections 111 and 112 which are constructed of different materials. In the illustrated embodiment, upper section 111 is constructed of enhanced polyurethane or another suitable buoyant material as discussed above, and lower section 112 is constructed of another suitable plastic material, so that only upper section 111 has buoyant properties. However, lower section 112 may instead be constructed of buoyant material and upper section 111 of non-buoyant material.

[0022] The gas cap 110 can be manufactured using a variety of techniques. First, the lower section 112 can be formed by molding and then positioned in a mold. The enhanced polyurethane can then be poured into the mold around an upper portion of the lower section 112, effectively molding the upper section 111 to the lower section 112. Alternatively, the lower section 112 could be attached to the upper section 111 in a suitable manner, such as by an adhesive.

[0023] It should be appreciated that the foregoing description is for the purposes of illustration only, and further alternative embodiments of this invention are possible without departing from the scope of the claims. For instance, while not illustrated, the upper section of the gas cap can be molded to include one of a variety of designs to make the gas cap more aesthetically pleasing and unique for the user. Thus, although particular preferred embodiments of the present invention have been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications lie within the scope of the present invention and do not depart from the spirit of the invention, as set forth in the foregoing description and drawings, and in the following claims.